

WHAT IS CLAIMED IS:

1. A method for treating a silicon substrate, comprising:

placing the silicon substrate into a sputtering chamber;

performing a sputtering step to simultaneously dry clean and amorphize the

5 silicon substrate surface by first using the sputtering chamber; and

in situ depositing a titanium film on the amorphized silicon substrate by second  
using the same sputtering chamber, wherein the sputtering chamber is an ionized metal  
plasma (IMP) equipment unit.

10 2. The method of claim 1, wherein the titanium film is deposited at about 540°C.

3. A method for treating a silicon substrate having a surface, comprising:

providing a pre-processing chamber, wherein the pre-processing chamber has  
first and second power supplies for sputtering argon therein, wherein the first power  
15 supply can provide the argon with a first bias, and the second power supply can provide  
the silicon substrate with a second bias;

placing the silicon substrate into the pre-processing chamber;

providing the first bias to the argon, and providing the second bias to the silicon  
substrate, wherein the first bias is substantially higher than the second bias;

20 modifying the first bias and the second bias to sputter the argon to  
simultaneously dry clean and amorphize the substrate surface;

forming a metal film on the amorphized substrate surface;

performing an annealing step, so that the metal film is reacted with the substrate  
surface to form a metal silicide layer; and

removing the metal film which is not reacted with the substrate surface.

4. The method of claim 3, wherein dry cleaning and amorphizing the substrate surface and forming the metal film are performed in different chambers.

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5. The method of claim 3, wherein the metal film is made of cobalt (Co).

6. The method of claim 3, wherein the metal film is deposited by  $\text{TiCl}_4$ -based CVD.

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7. The method of claim 3, wherein the metal film is formed on the amorphized substrate surface at a temperature of about  $540^\circ\text{C}$ .

8. A method for treating a silicon substrate having a surface, comprising:

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providing a pre-processing chamber, wherein the pre-processing chamber has first and second power supplies for sputtering argon therein, wherein the first power supply can provide the argon with a first bias, and the second power supply can provide the silicon substrate with a second bias;

placing the silicon substrate into the pre-processing chamber;

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providing the first bias to the argon;

providing the second bias to the silicon substrate;

modifying the first bias and the second bias to sputter the argon to simultaneously dry clean and amorphize the substrate surface;

forming a metal film on the amorphized substrate surface, wherein dry cleaning

and amorphizing the substrate surface and forming the metal film are performed in different chambers;

performing an annealing step, so that the metal film is reacted with the substrate surface to form a metal silicide layer; and

5 removing the metal film which is not reacted with the substrate surface.

9. The method of claim 8, wherein the metal film is made of cobalt (Co).

10. The method of claim 8, wherein the metal film is deposited by TiCl<sub>4</sub>-based  
10 CVD.

11. The method of claim 8, wherein the metal film is formed on the amorphized substrate surface at a temperature of about 540°C.